

## 14.2 BLOCK DIAGRAM OF TEST SETUP



## 14.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1:  $Level = Read\ Level + Cable\ Loss + Antenna\ Factor - Preamp\ Factor$

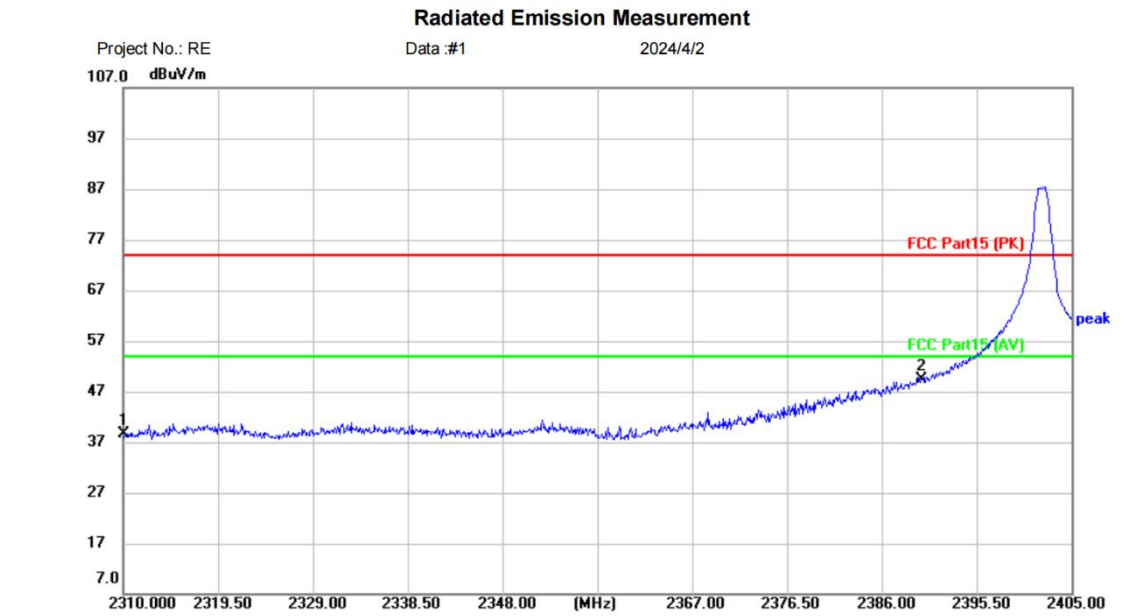
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

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### 14.4 TEST DATA

Remark: During the test, pre-scan the BLE 1M, BLE 2M, and found the BLE 1M which it is worse case.

[TestMode: TX low channel]; [Polarity: Horizontal]



Site:      Polarization: **Horizontal**      Temperature: (C)  
Limit: FCC Part15 (PK)      Power:      Humidity: %RH  
EUT: BT module  
M/N: RSBRS02ABR-01  
Mode: BLE 1M 2402  
Note:

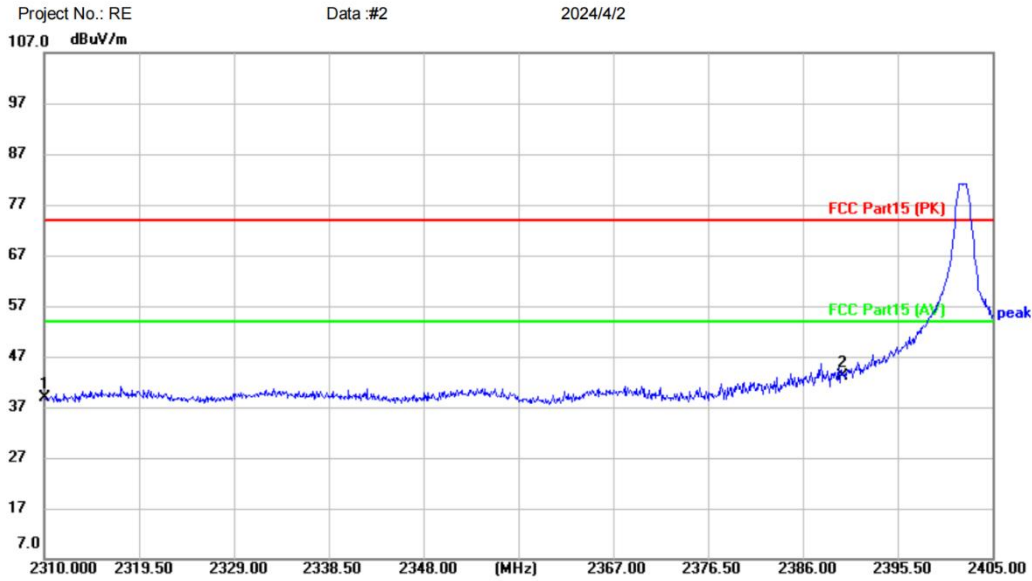
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1		2310.000	41.42	-2.89	38.53	74.00	-35.47	peak	
2	*	2390.000	52.01	-2.70	49.31	74.00	-24.69	peak	

\*:Maximum data    x:Over limit    !:over margin      (Reference Only)  
Receiver: ESR\_1      Spectrum Analyzer: FSP40  
Antenna: EZ 9120D 1G-18G      Engineer Signature:

**Test Result: Pass**

[TestMode: TX low channel]; [Polarity: Vertical]

**Radiated Emission Measurement**



Site:      Polarization: **Vertical**      Temperature: (C)  
 Limit: FCC Part15 (PK)      Power:      Humidity: %RH  
 EUT: BT module  
 M/N: RSBRS02ABR-01  
 Mode: BLE 1M 2402  
 Note:

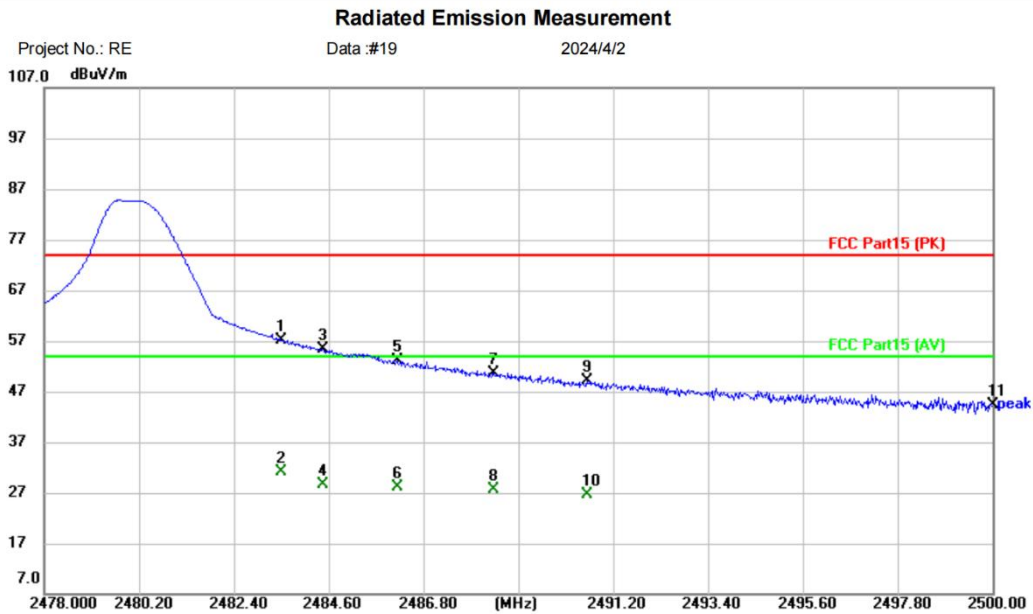
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		2310.000	41.75	-2.89	38.86	74.00	-35.14	peak	
2	*	2390.000	45.83	-2.70	43.13	74.00	-30.87	peak	

\*:Maximum data    x:Over limit    !:over margin      (Reference Only)

Receiver:      ESR\_1      Spectrum Analyzer:      FSP40  
 Antenna:      EZ 9120D 1G-18G      Engineer Signature:

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Horizontal]



Site	Polarization: <b>Horizontal</b>	Temperature: (C)
Limit: FCC Part15 (PK)	Power:	Humidity: %RH
EUT: BT module		
M/N: RSBRS02ABR-01		
Mode: BLE 1M 2480		
Note:		

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2483.500	60.00	-2.91	57.09	74.00	-16.91	peak	
2		2483.500	33.94	-2.91	31.03	54.00	-22.97	AVG	
3		2484.468	58.25	-2.91	55.34	74.00	-18.66	peak	
4		2484.468	31.52	-2.91	28.61	54.00	-25.39	AVG	
5		2486.184	56.04	-2.92	53.12	74.00	-20.88	peak	
6		2486.184	31.04	-2.92	28.12	54.00	-25.88	AVG	
7		2488.428	53.60	-2.94	50.66	74.00	-23.34	peak	
8		2488.428	30.51	-2.94	27.57	54.00	-26.43	AVG	
9		2490.584	52.15	-2.95	49.20	74.00	-24.80	peak	
10		2490.584	29.67	-2.95	26.72	54.00	-27.28	AVG	
11		2500.000	47.27	-3.00	44.27	74.00	-29.73	peak	

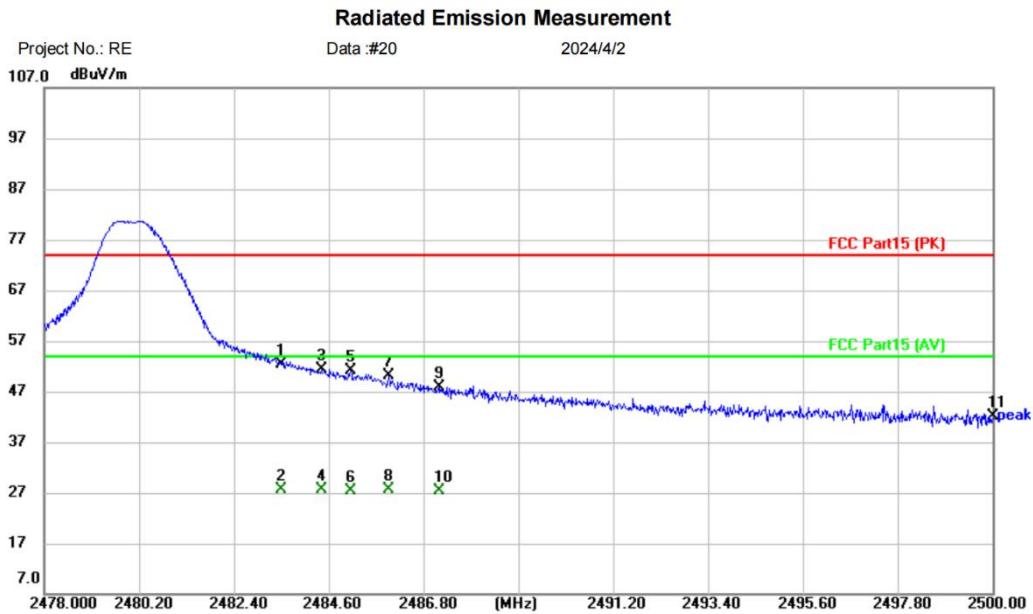
\*:Maximum data    x:Over limit    !:over margin

(Reference Only)

Receiver: ESR\_1      Spectrum Analyzer: FSP40  
 Antenna: EZ 9120D 1G-18G      Engineer Signature:

**Test Result: Pass**

[TestMode: TX high channel]; [Polarity: Vertical]



Site	Polarization: <b>Vertical</b>	Temperature: (C)
Limit: FCC Part15 (PK)	Power:	Humidity: %RH
EUT: BT module		
M/N: RSBRS02ABR-01		
Mode: BLE 1M 2480		
Note:		

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	2483.500	55.39	-2.91	52.48	74.00	-21.52	peak	
2		2483.500	30.52	-2.91	27.61	54.00	-26.39	AVG	
3		2484.424	54.25	-2.91	51.34	74.00	-22.66	peak	
4		2484.424	30.45	-2.91	27.54	54.00	-26.46	AVG	
5		2485.106	54.09	-2.92	51.17	74.00	-22.83	peak	
6		2485.106	30.37	-2.92	27.45	54.00	-26.55	AVG	
7		2485.986	52.93	-2.92	50.01	74.00	-23.99	peak	
8		2485.986	30.52	-2.92	27.60	54.00	-26.40	AVG	
9		2487.174	50.90	-2.93	47.97	74.00	-26.03	peak	
10		2487.174	30.25	-2.93	27.32	54.00	-26.68	AVG	
11		2500.000	45.13	-3.00	42.13	74.00	-31.87	peak	

\*:Maximum data    x:Over limit    !:over margin

(Reference Only)

Receiver: ESR\_1      Spectrum Analyzer: FSP40  
 Antenna: EZ 9120D 1G-18G      Engineer Signature:

**Test Result: Pass**

Remark:

1. Final Level = Receiver Read level + Correct factor
2. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

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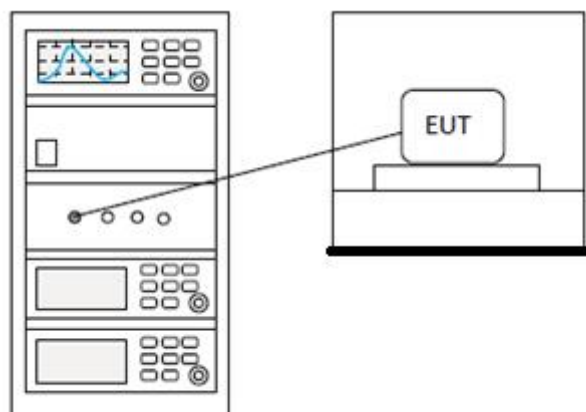
## 15 CONDUCTED SPURIOUS EMISSIONS

<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 7.8.6 & Section 11.11
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Jozu
<b>Temperature</b>	25°C
<b>Humidity</b>	60%

### 15.1 LIMITS

<b>Limit:</b>	<p>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).</p>
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### 15.2 BLOCK DIAGRAM OF TEST SETUP



### 15.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**



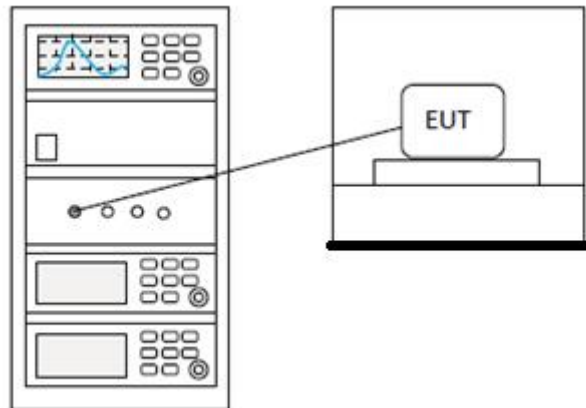
## 16 POWER SPECTRUM DENSITY

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 11.10.2
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25°C
Humidity	60%

### 16.1 LIMITS

**Limit:**  $\leq 8\text{dBm}$  in any 3 kHz band during any time interval of continuous transmission

### 16.2 BLOCK DIAGRAM OF TEST SETUP



### 16.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

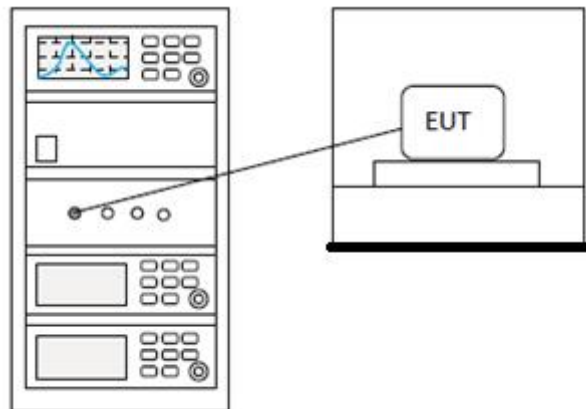
## 17 CONDUCTED PEAK OUTPUT POWER

<b>Test Standard</b>	47 CFR Part 15, Subpart C 15.247
<b>Test Method</b>	ANSI C63.10 (2013) Section 7.8.5
<b>Test Mode (Pre-Scan)</b>	TX
<b>Test Mode (Final Test)</b>	TX
<b>Tester</b>	Jozu
<b>Temperature</b>	25°C
<b>Humidity</b>	60%

### 17.1 LIMITS

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for $\geq 50$ hopping channels
	0.25 for $25 \leq$ hopping channels $< 50$
	1 for digital modulation
2400-2483.5	1 for $\geq 75$ non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

### 17.2 BLOCK DIAGRAM OF TEST SETUP



### 17.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

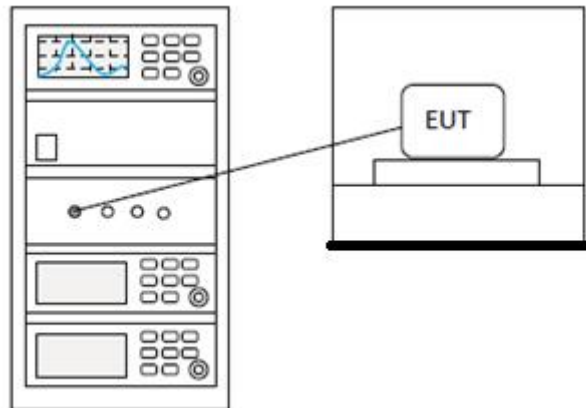
## 18 MINIMUM 6DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	ANSI C63.10 (2013) Section 11.8.1
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Jozu
Temperature	25°C
Humidity	60%

### 18.1 LIMITS

Limit:	$\geq 500$ kHz
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### 18.2 BLOCK DIAGRAM OF TEST SETUP



### 18.3 TEST DATA

**Pass: Please Refer To Appendix: Appendix1 For Details**

## 19 ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.247
Test Method	N/A

### 19.1 CONCLUSION

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

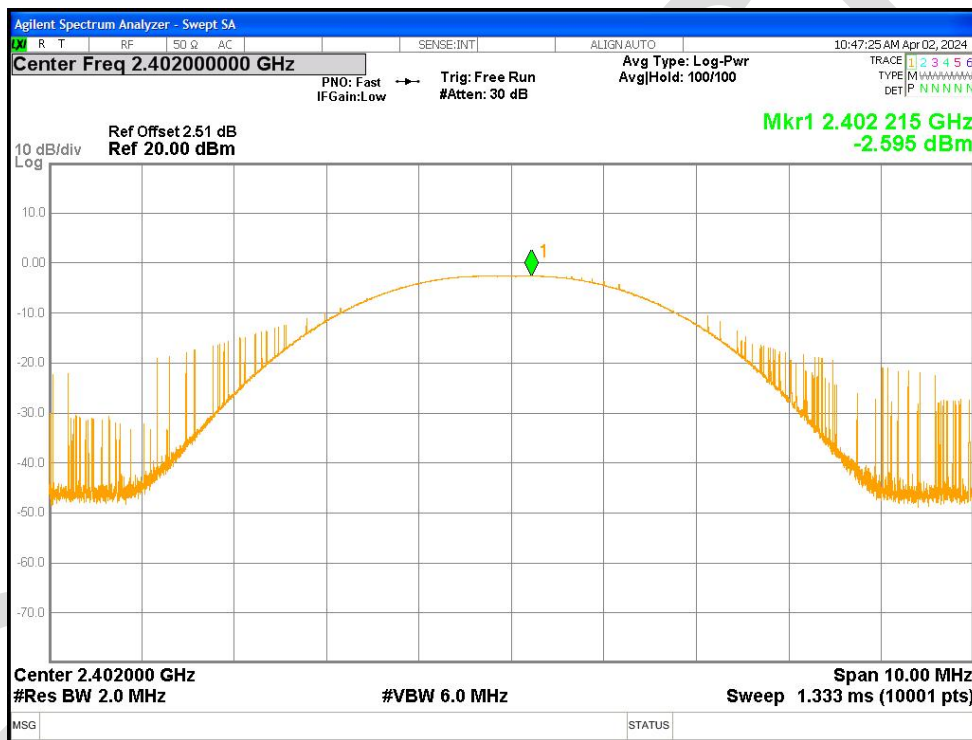
The best case gain of the antenna is -0.89dBi.

## 20 APPENDIX1

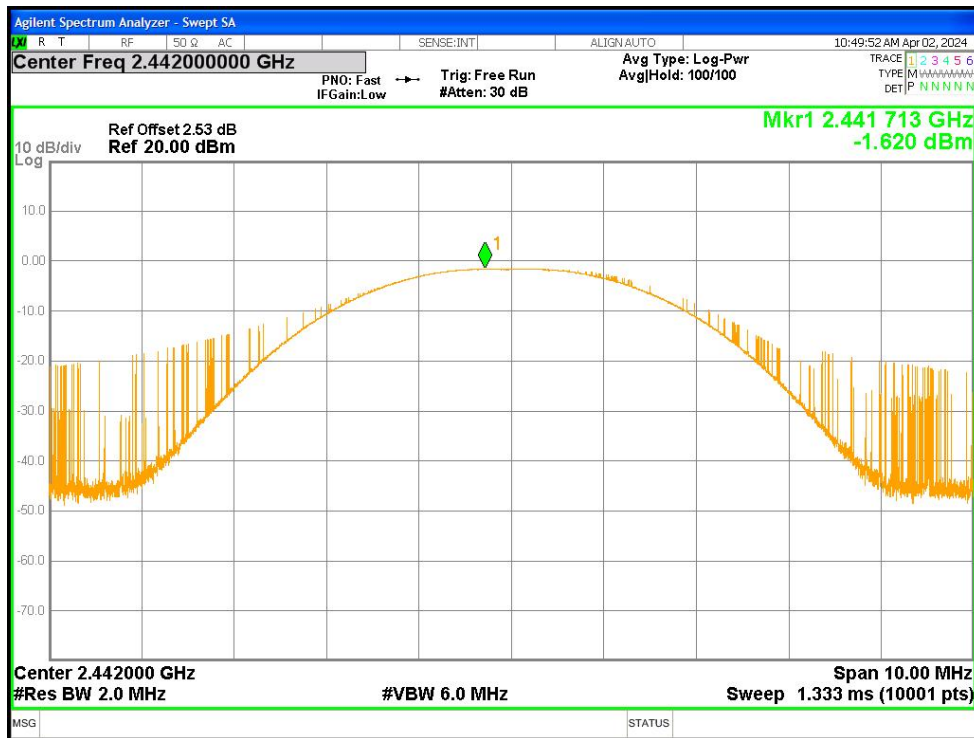
### Maximum Conducted Output Power

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-2.595	30	Pass
NVNT	BLE 1M	2442	Ant1	-1.62	30	Pass
NVNT	BLE 1M	2480	Ant1	-1.755	30	Pass
NVNT	BLE 2M	2402	Ant1	-2.409	30	Pass
NVNT	BLE 2M	2442	Ant1	-1.485	30	Pass
NVNT	BLE 2M	2480	Ant1	-1.665	30	Pass

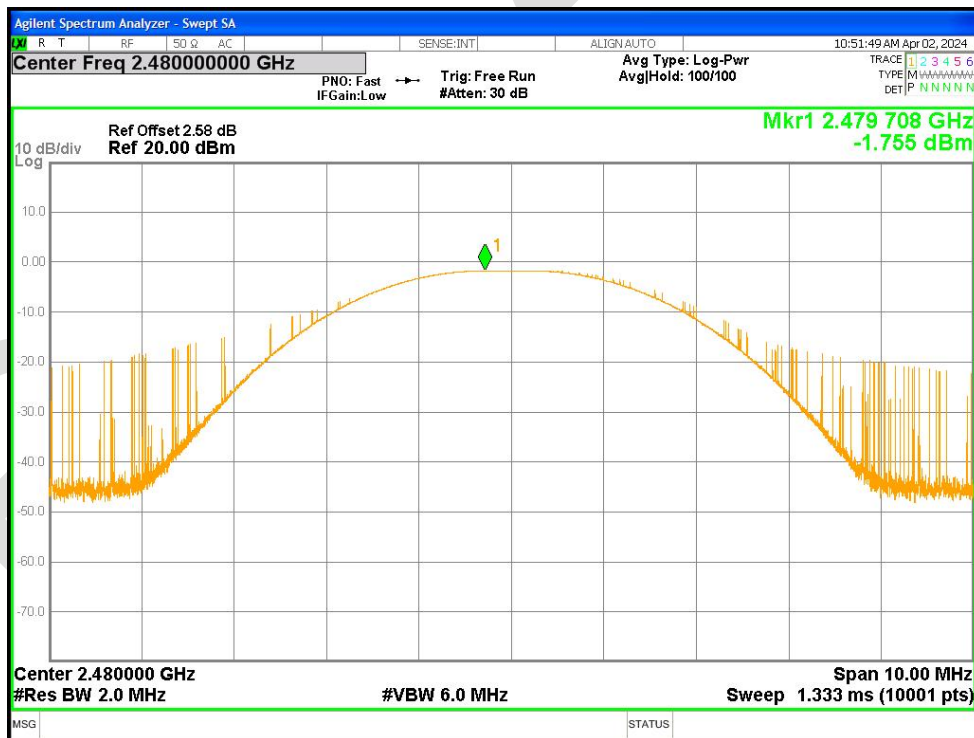
Power NVNT BLE 1M 2402MHz Ant1



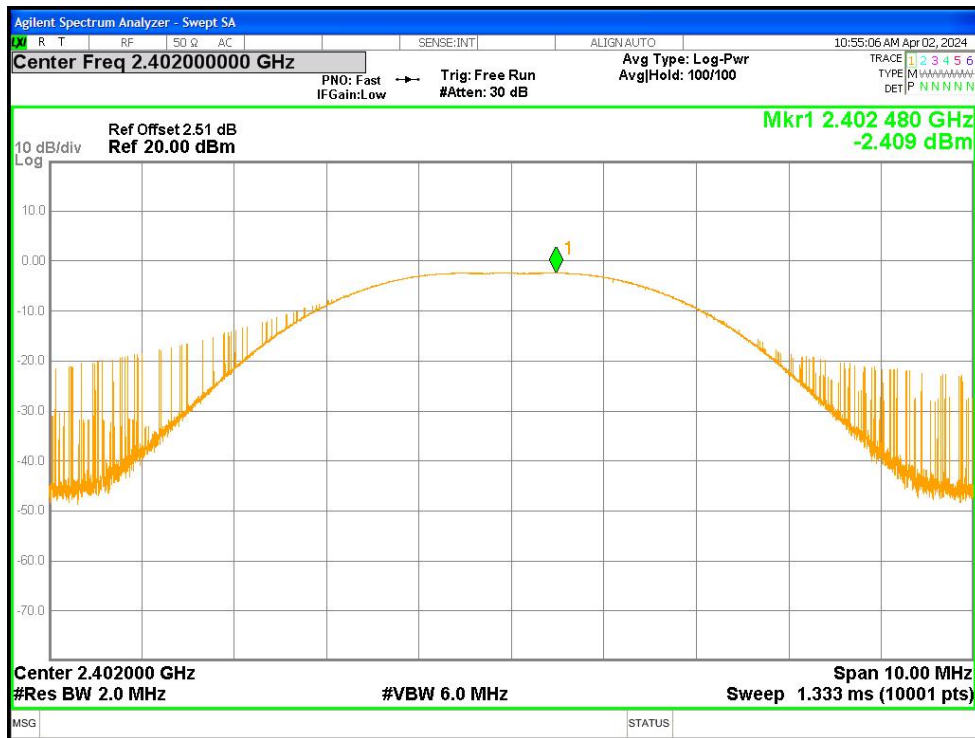
Power NVNT BLE 1M 2442MHz Ant1



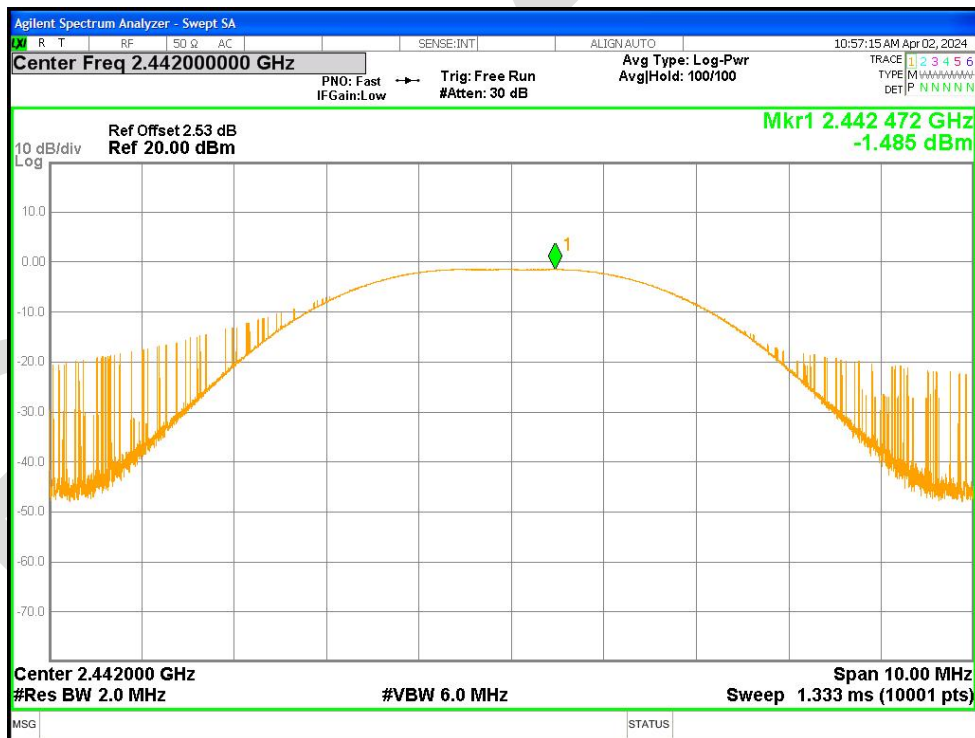
Power NVNT BLE 1M 2480MHz Ant1



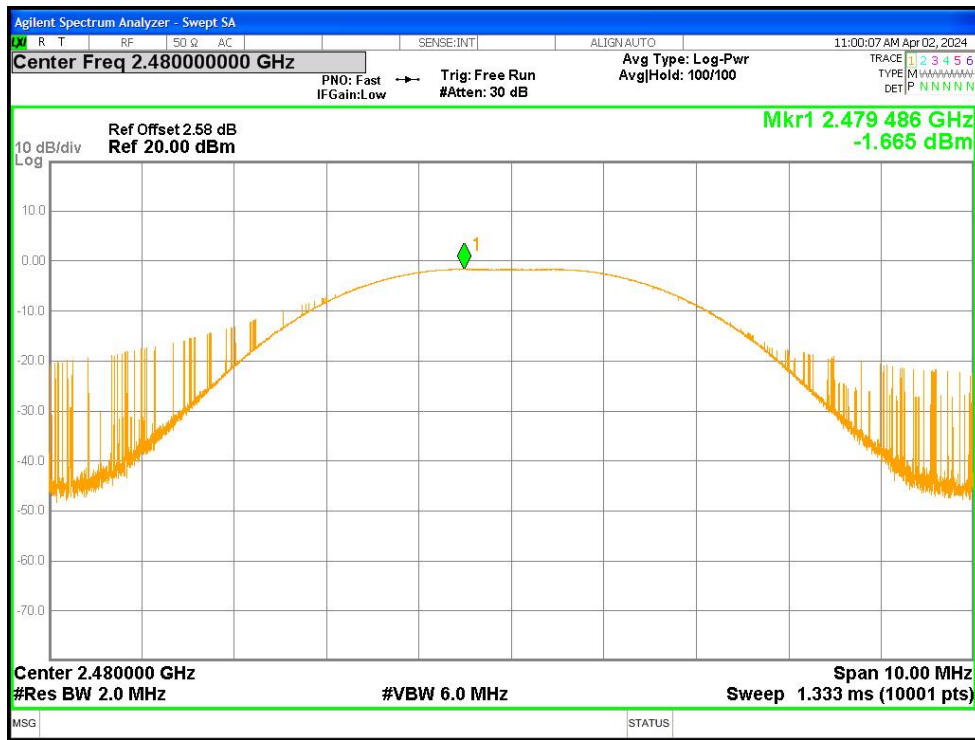
Power NVNT BLE 2M 2402MHz Ant1



Power NVNT BLE 2M 2442MHz Ant1



Power NVNT BLE 2M 2480MHz Ant1

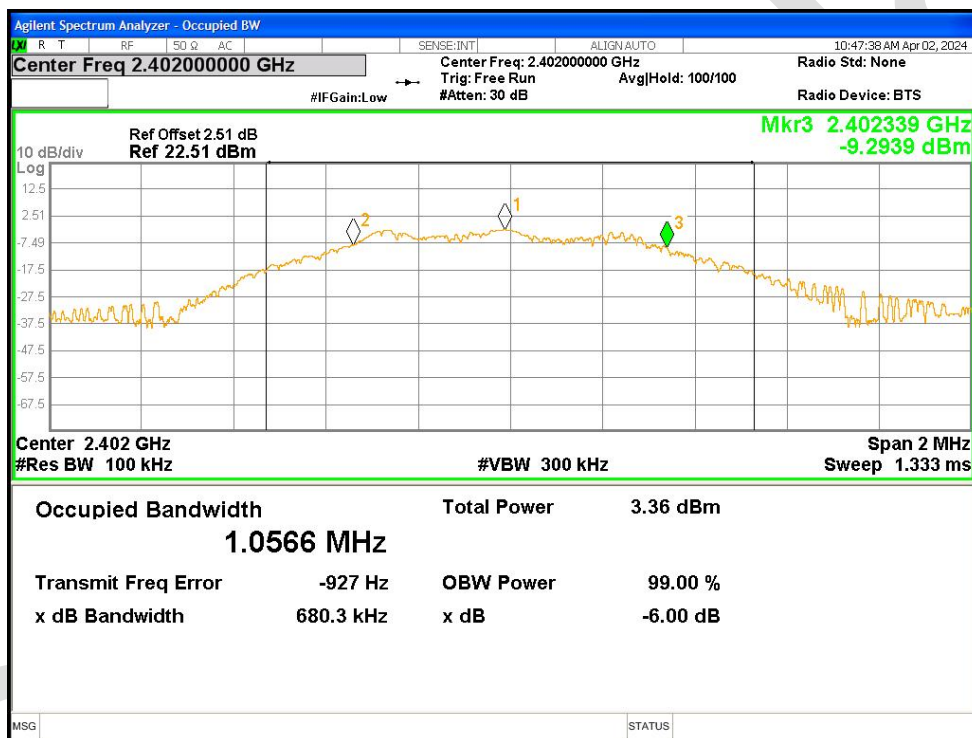


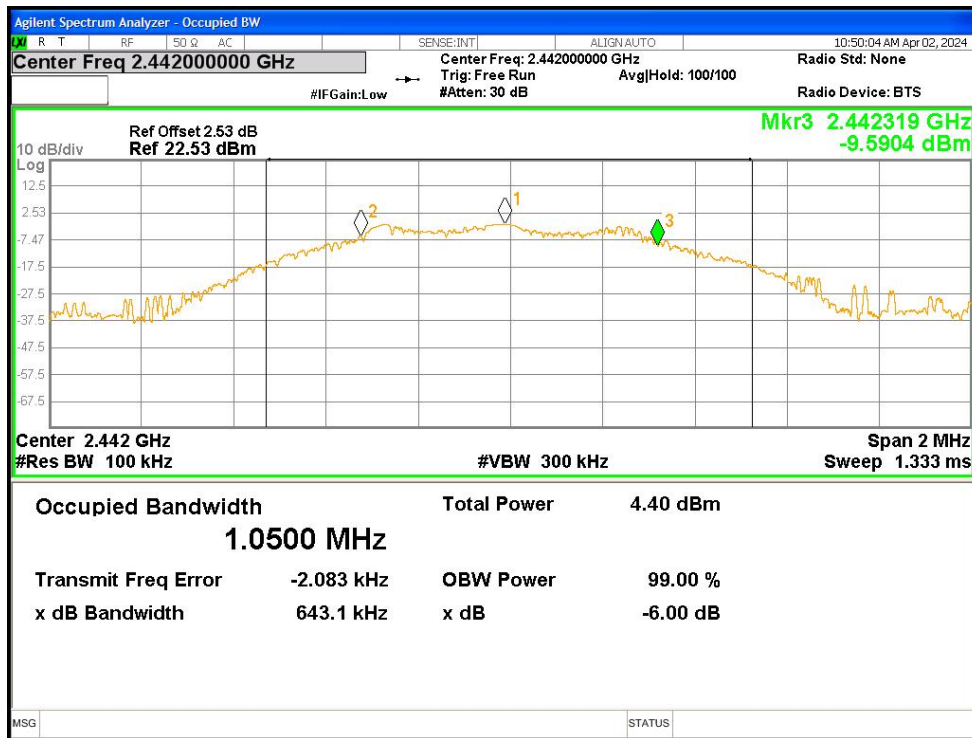
BlueE



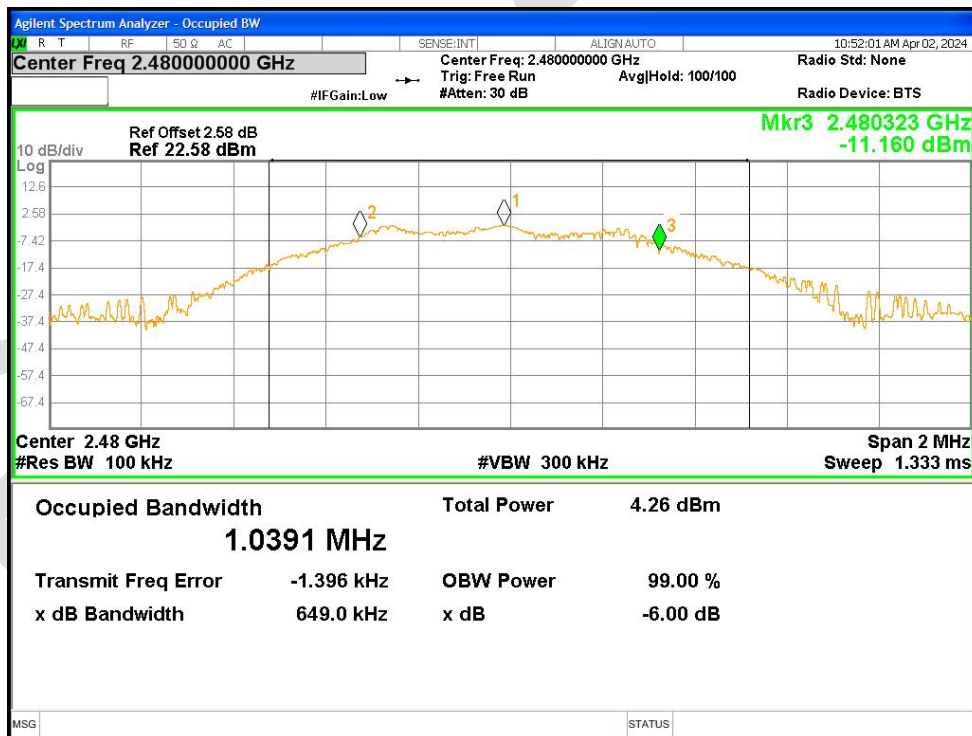
**-6dB Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	Ant1	0.68	0.5	Pass
NVNT	BLE 1M	2442	Ant1	0.643	0.5	Pass
NVNT	BLE 1M	2480	Ant1	0.649	0.5	Pass
NVNT	BLE 2M	2402	Ant1	1.112	0.5	Pass
NVNT	BLE 2M	2442	Ant1	1.144	0.5	Pass
NVNT	BLE 2M	2480	Ant1	1.132	0.5	Pass

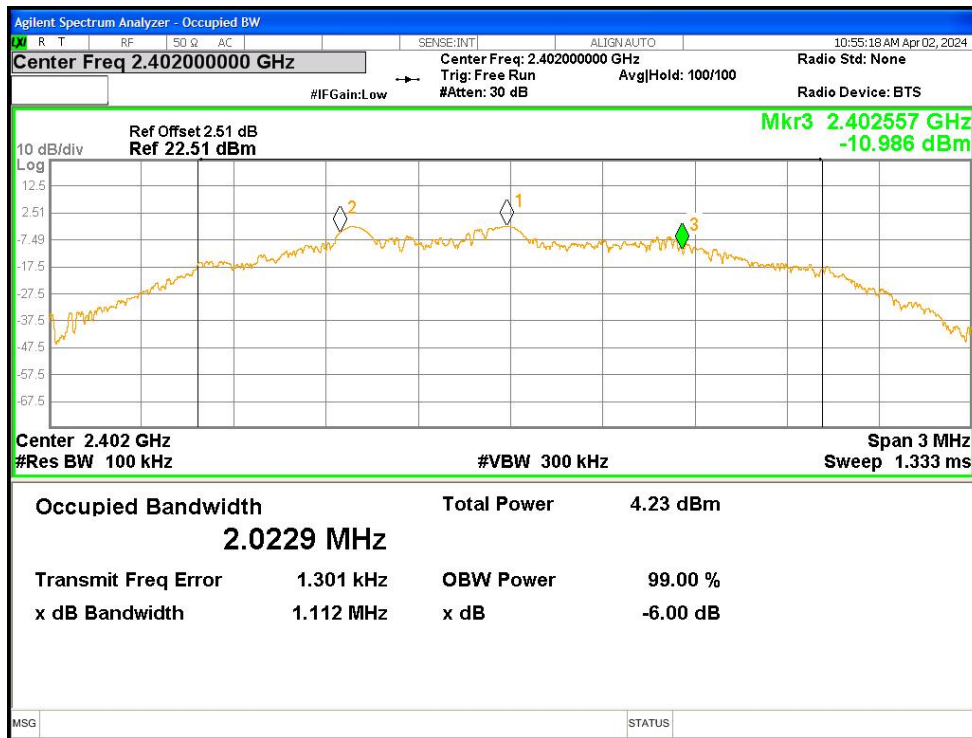
**-6dB Bandwidth NVNT BLE 1M 2402MHz Ant1**

**-6dB Bandwidth NVNT BLE 1M 2442MHz Ant1**



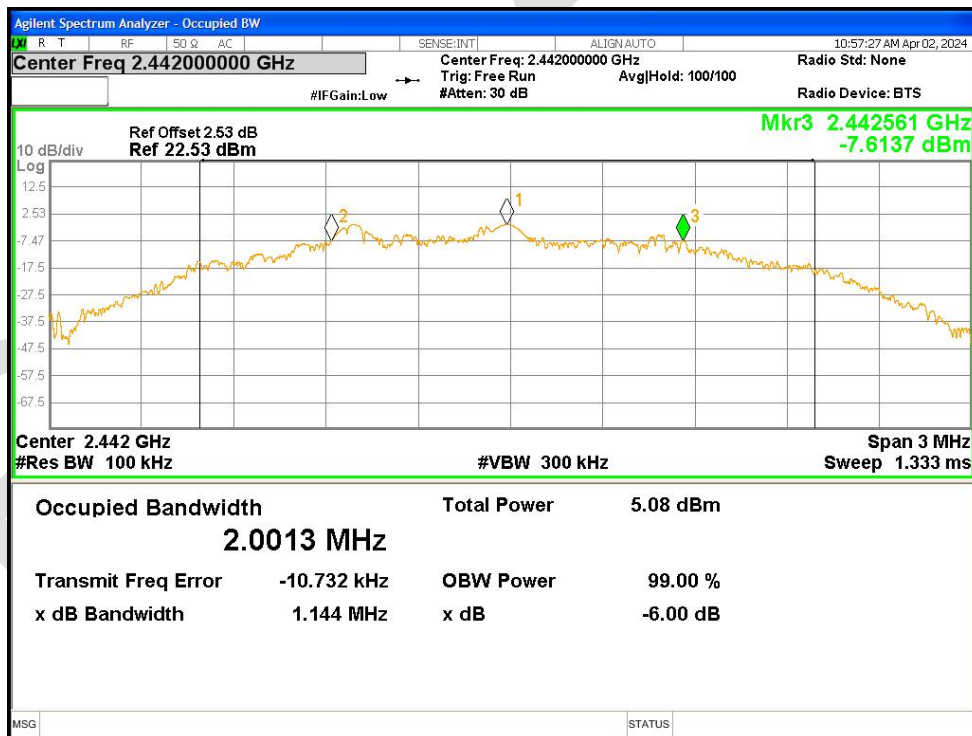
-6dB Bandwidth NVNT BLE 1M 2480MHz Ant1



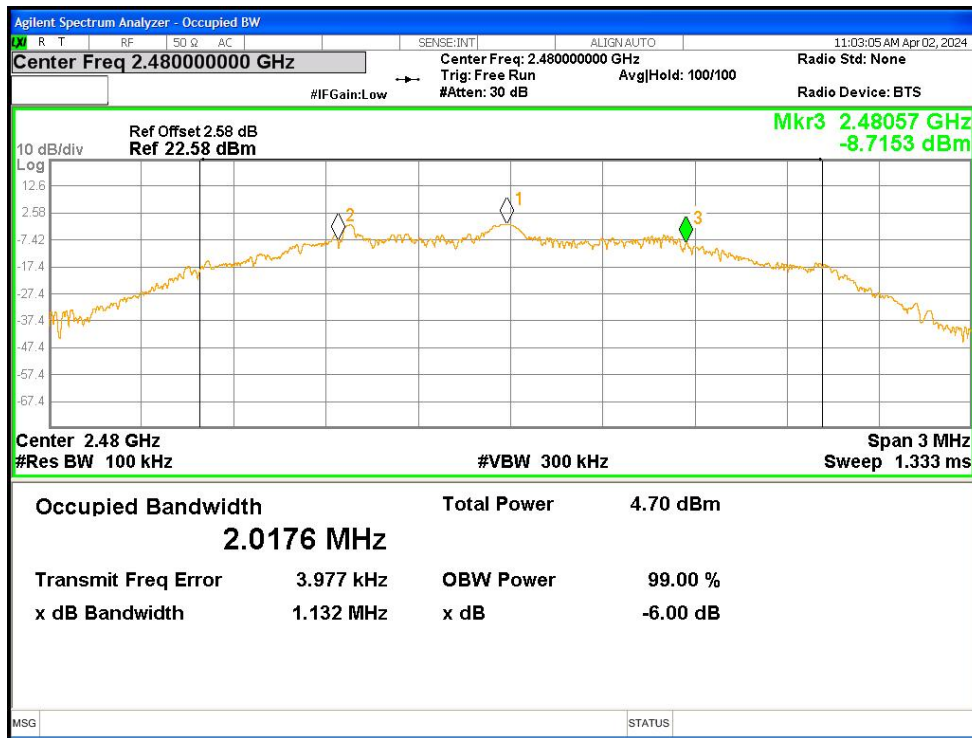
-6dB Bandwidth NVNT BLE 2M 2402MHz Ant1



-6dB Bandwidth NVNT BLE 2M 2442MHz Ant1



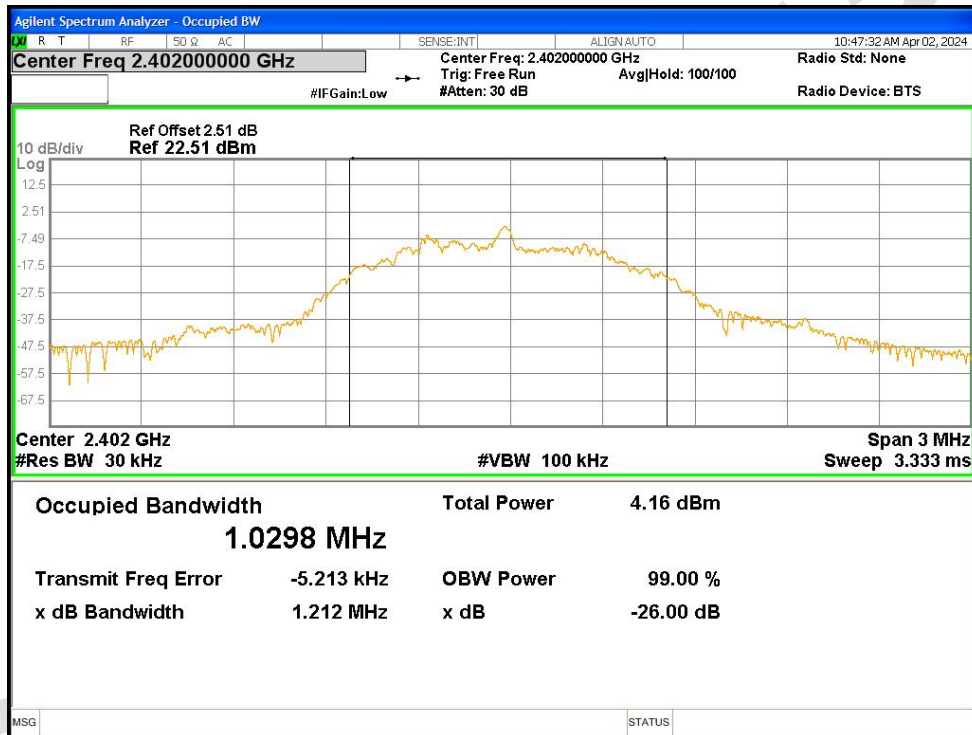
-6dB Bandwidth NVNT BLE 2M 2480MHz Ant1



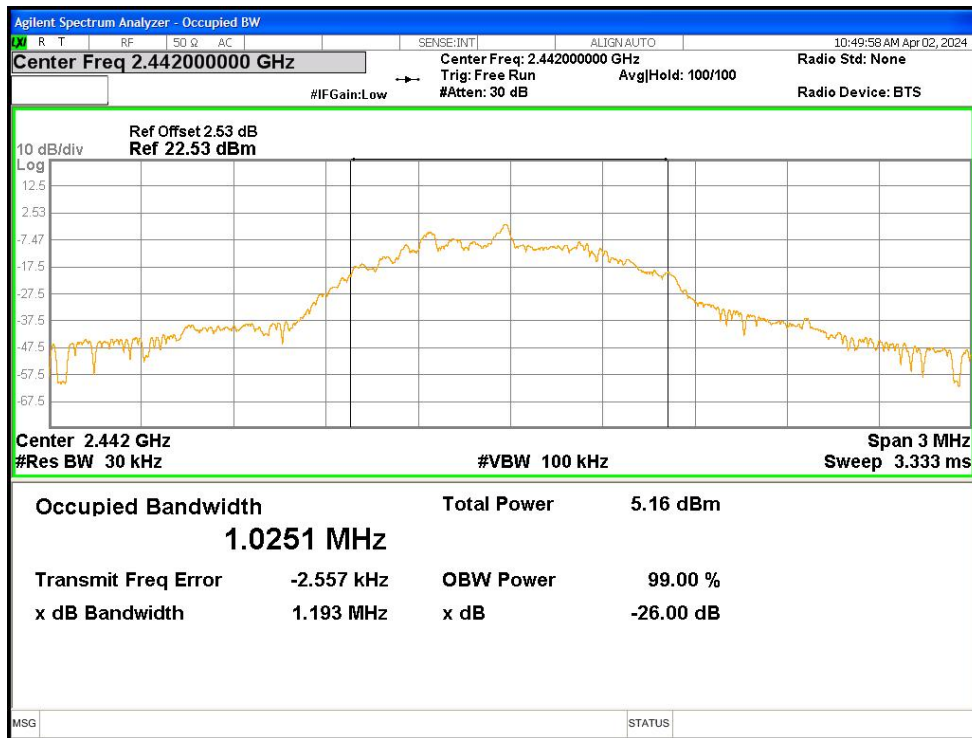
**Occupied Channel Bandwidth**

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	BLE 1M	2402	Ant1	1.0298
NVNT	BLE 1M	2442	Ant1	1.0251
NVNT	BLE 1M	2480	Ant1	1.0238
NVNT	BLE 2M	2402	Ant1	2.0075
NVNT	BLE 2M	2442	Ant1	1.9984
NVNT	BLE 2M	2480	Ant1	1.9804

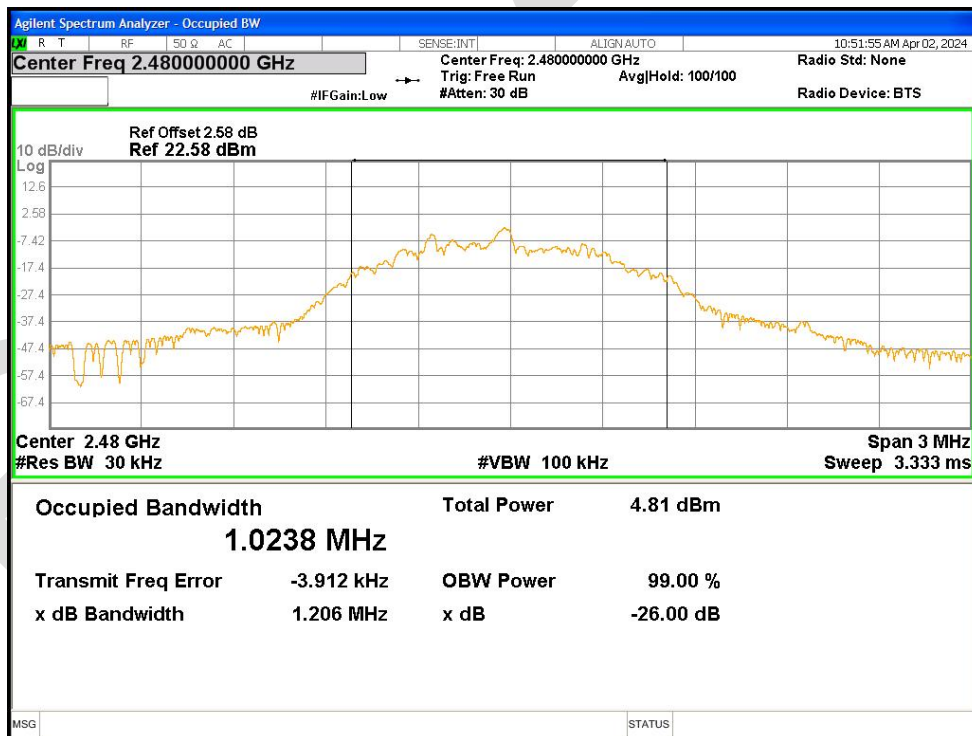
OBW NVNT BLE 1M 2402MHz Ant1



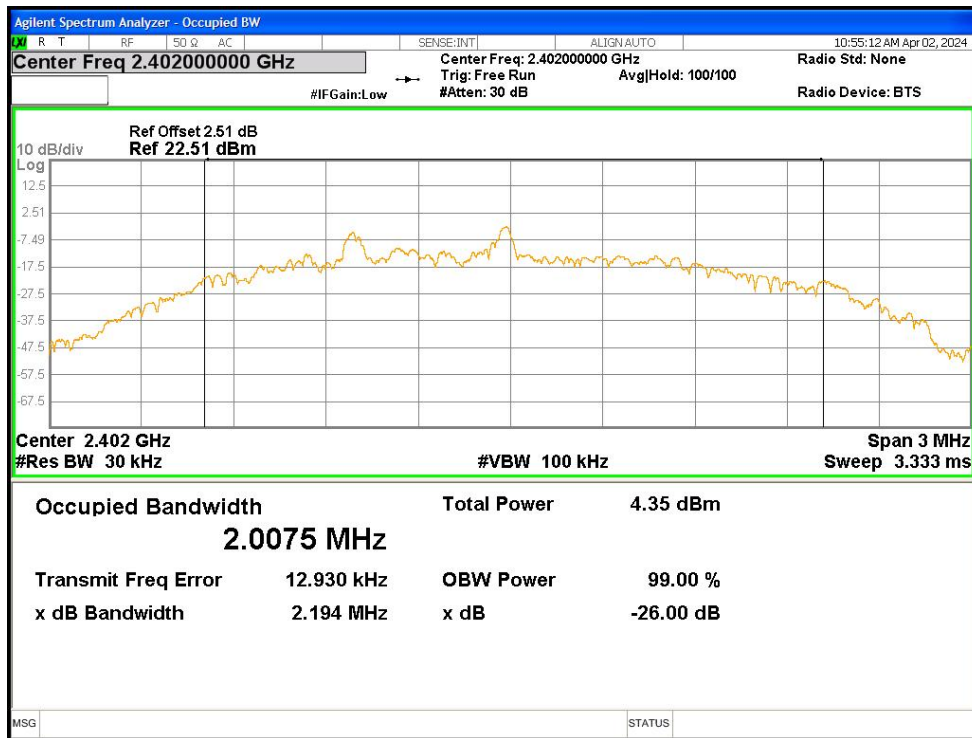
OBW NVNT BLE 1M 2442MHz Ant1



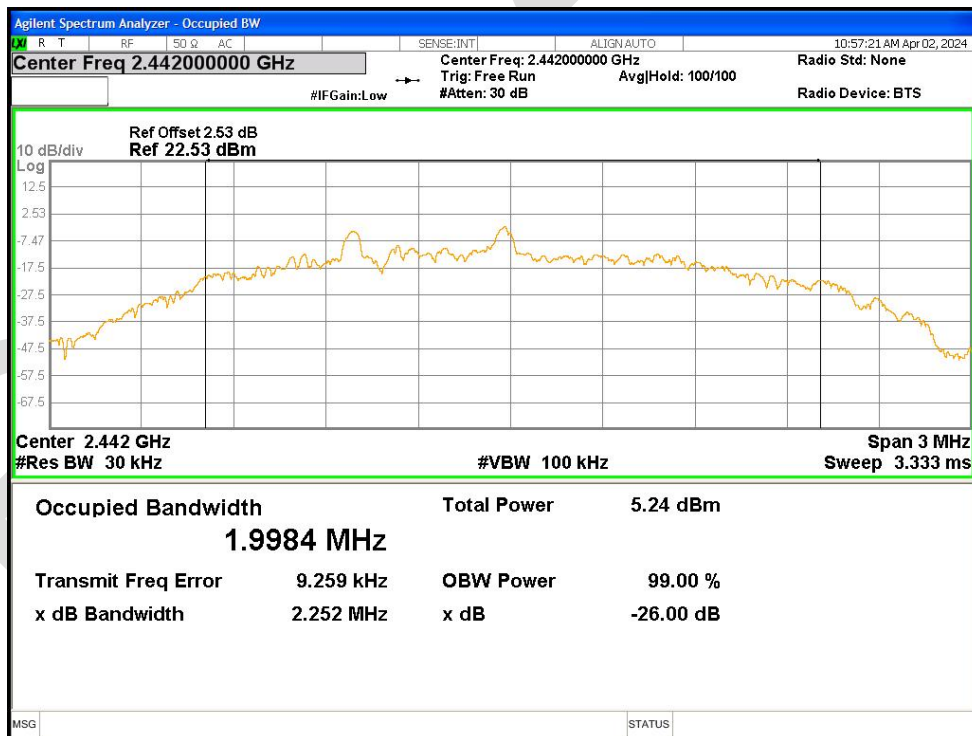
OBW NVNT BLE 1M 2480MHz Ant1



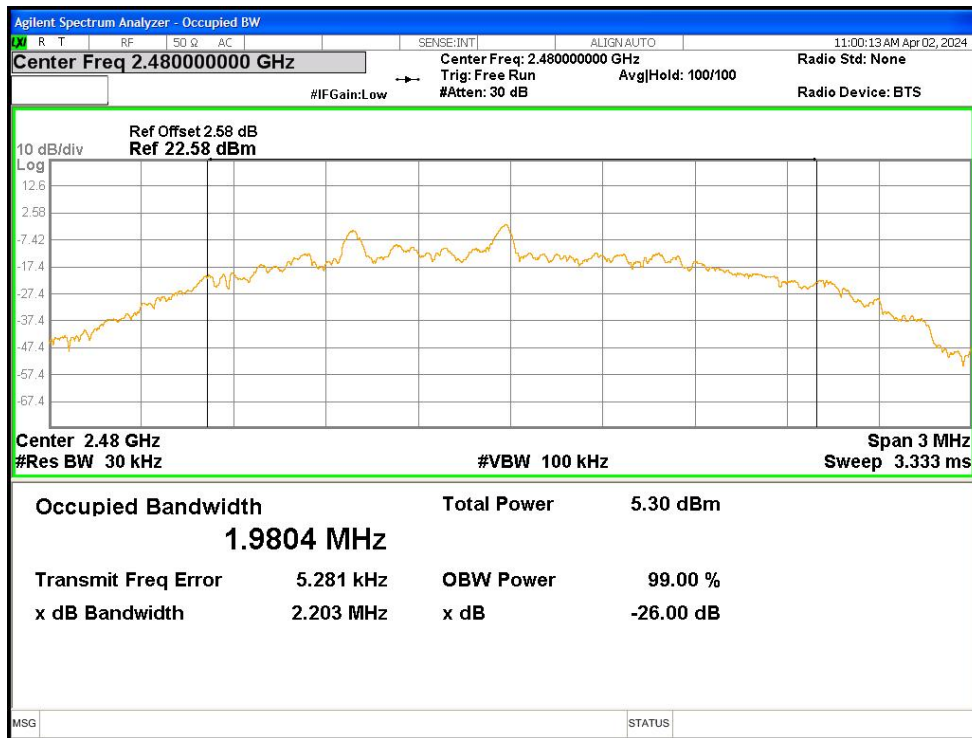
OBW NVNT BLE 2M 2402MHz Ant1



OBW NVNT BLE 2M 2442MHz Ant1



OBW NVNT BLE 2M 2480MHz Ant1

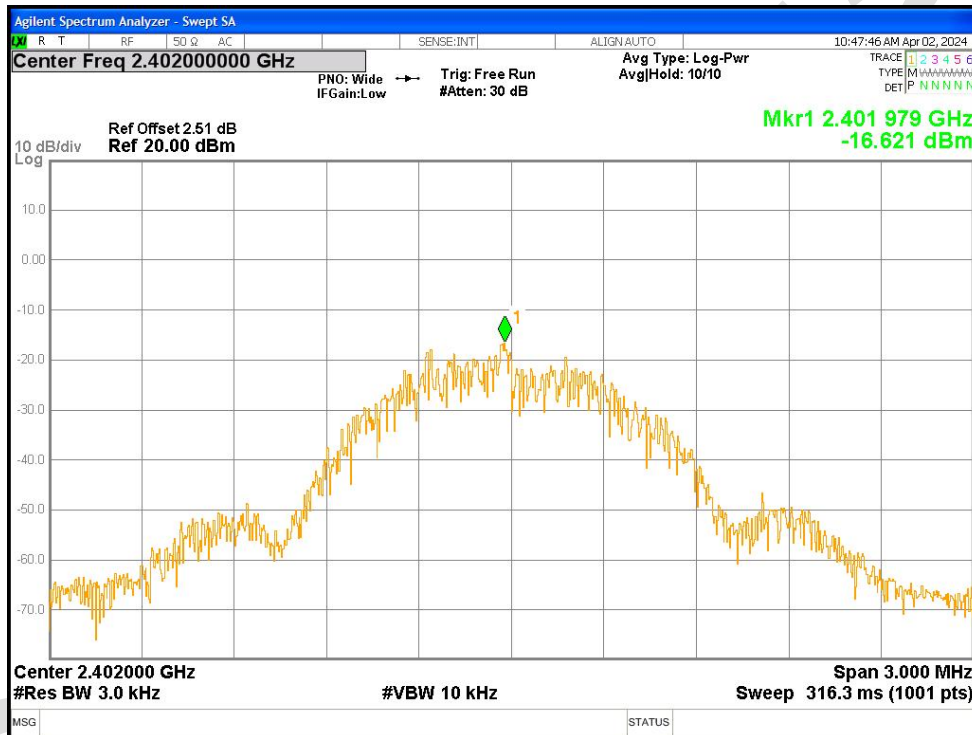




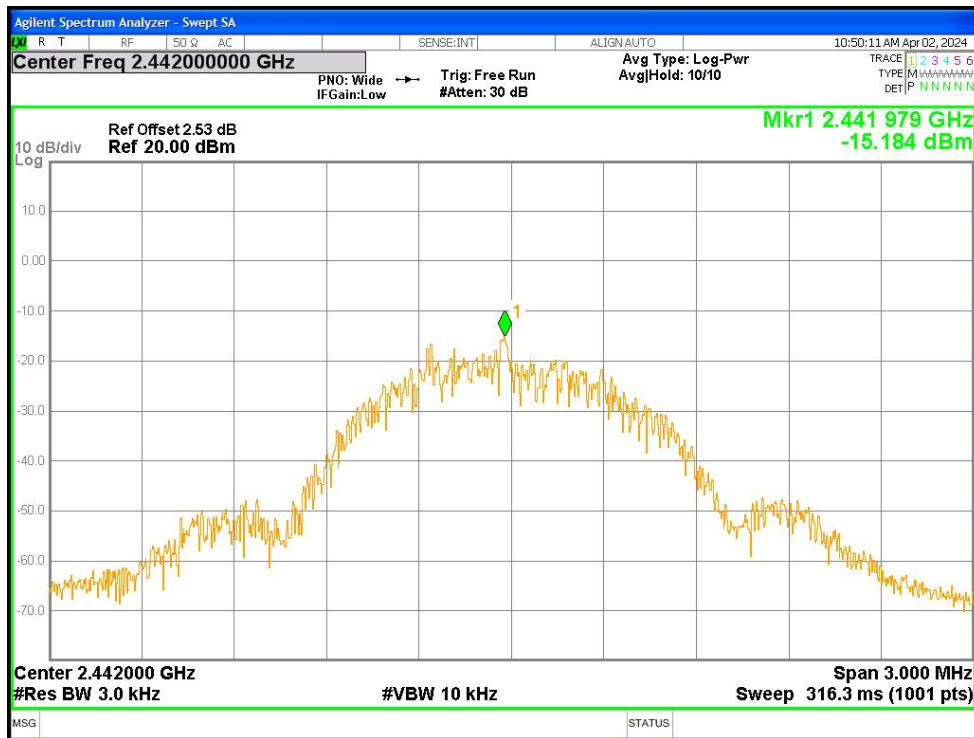
**Maximum Power Spectral Density Level**

Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	Ant1	-16.621	8	Pass
NVNT	BLE 1M	2442	Ant1	-15.184	8	Pass
NVNT	BLE 1M	2480	Ant1	-15.009	8	Pass
NVNT	BLE 2M	2402	Ant1	-16.392	8	Pass
NVNT	BLE 2M	2442	Ant1	-15.146	8	Pass
NVNT	BLE 2M	2480	Ant1	-14.986	8	Pass

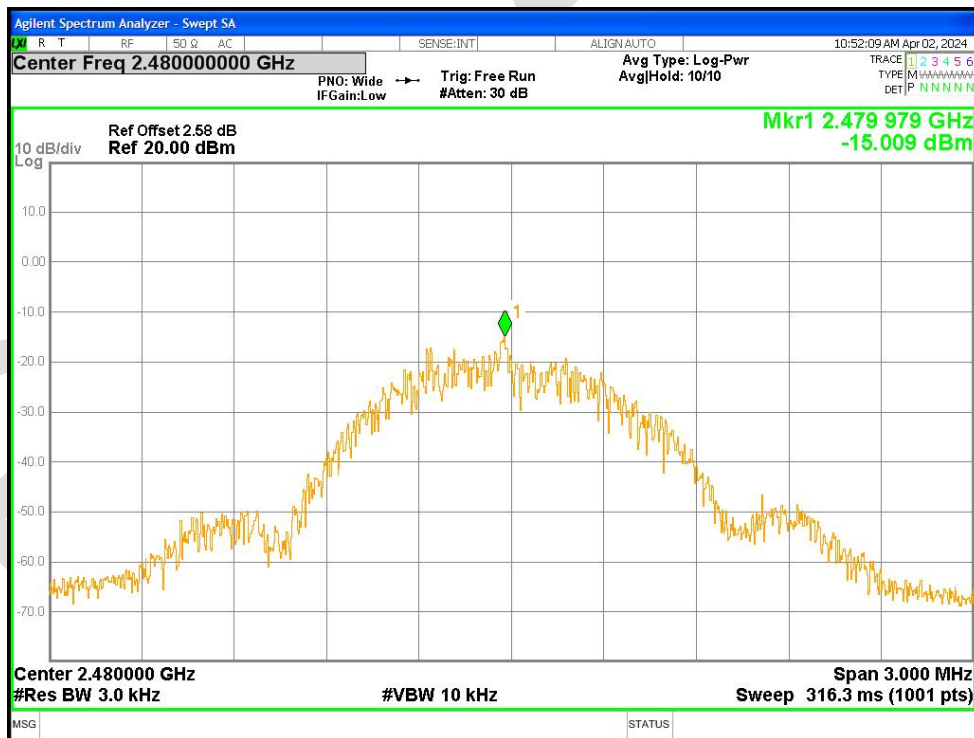
PSD NVNT BLE 1M 2402MHz Ant1



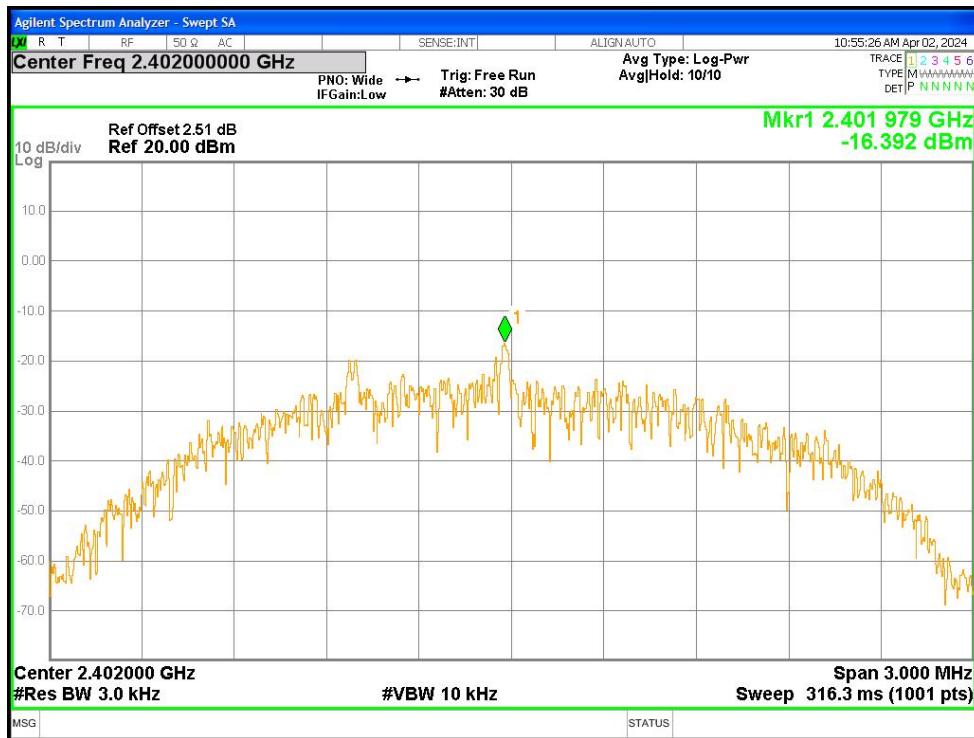
PSD NVNT BLE 1M 2442MHz Ant1



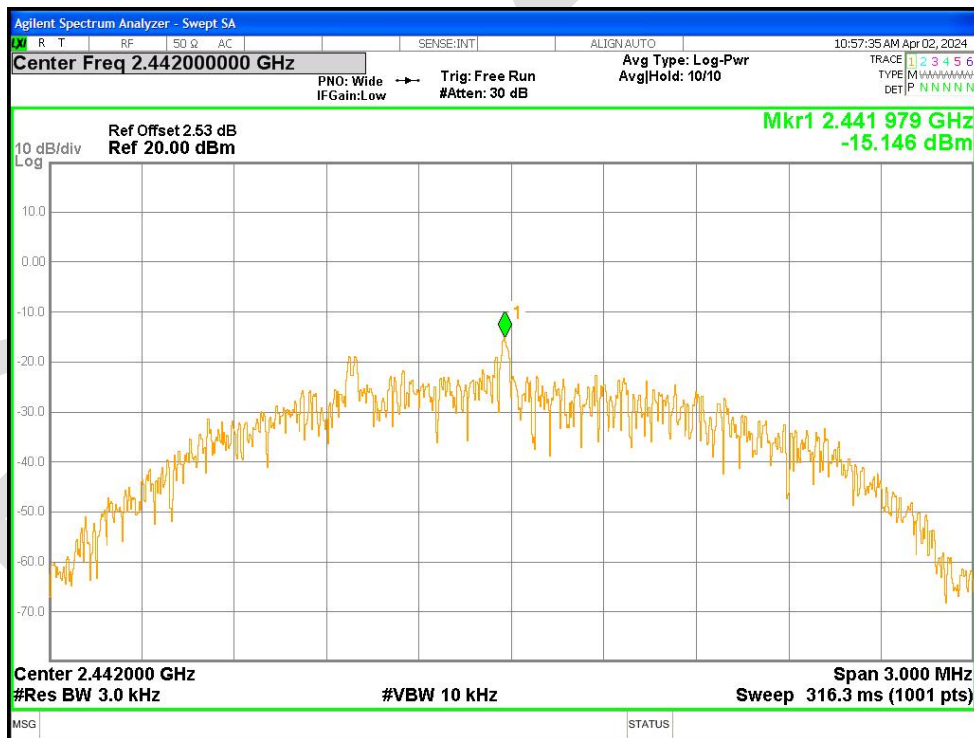
PSD NVNT BLE 1M 2480MHz Ant1



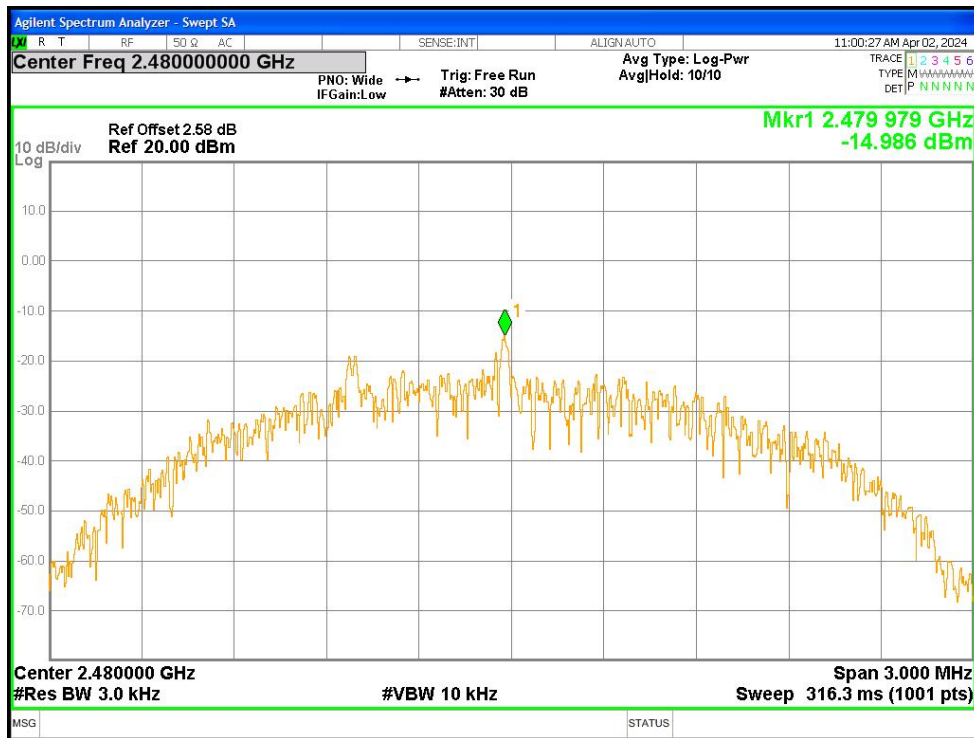
PSD NVNT BLE 2M 2402MHz Ant1



PSD NVNT BLE 2M 2442MHz Ant1



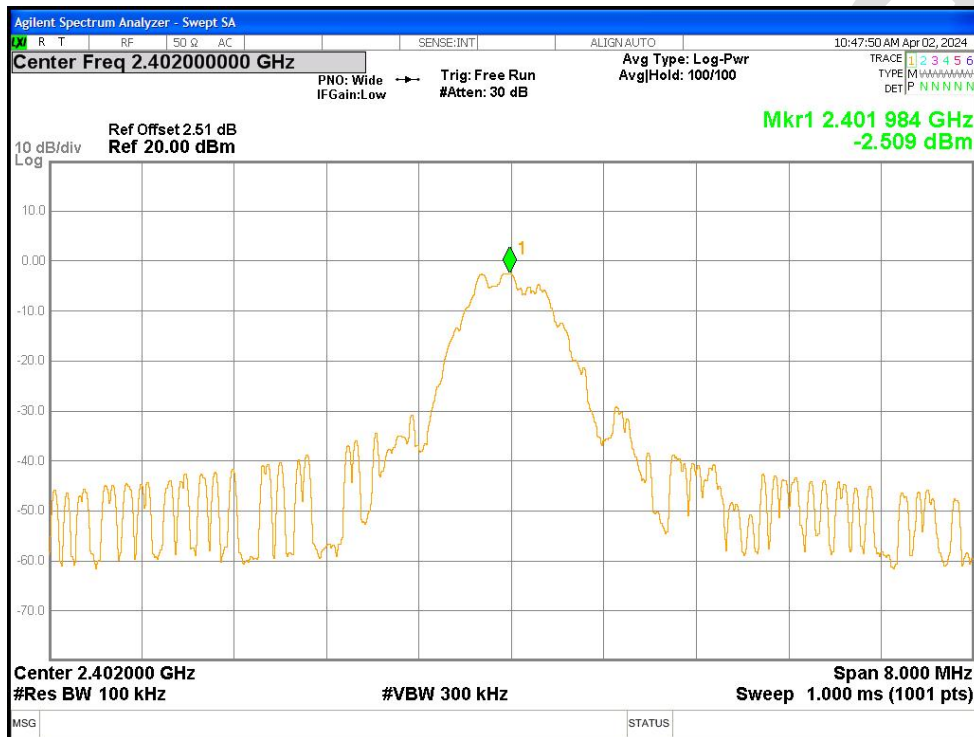
PSD NVNT BLE 2M 2480MHz Ant1



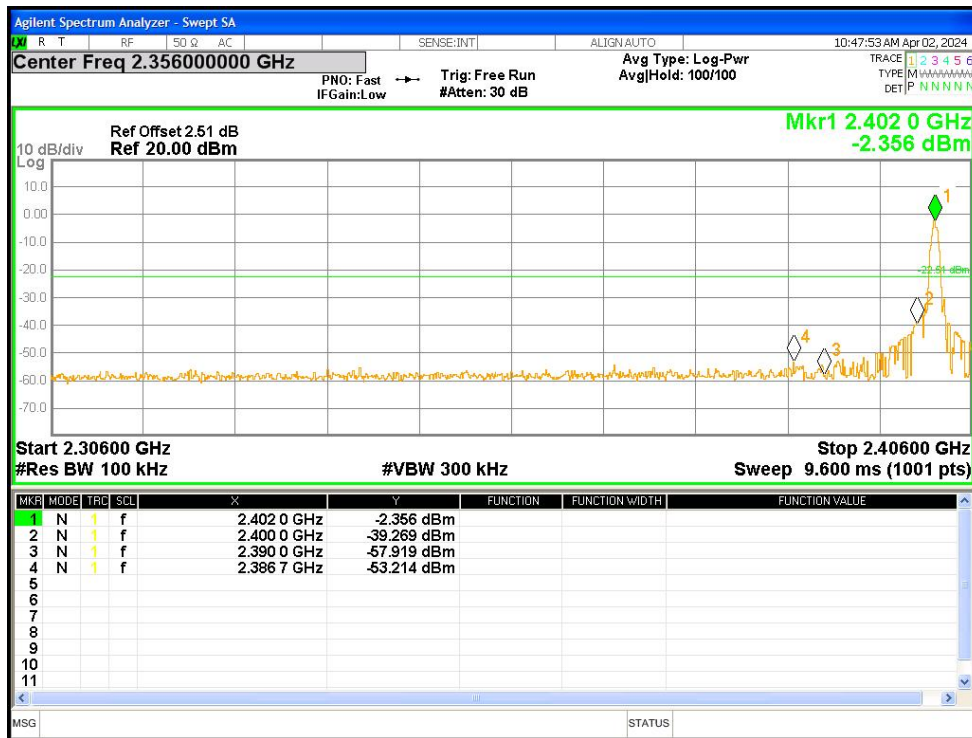
**Band Edge**

Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	BLE 1M	2402	Ant1	-50.7	-20	Pass
NVNT	BLE 1M	2480	Ant1	-42.28	-20	Pass
NVNT	BLE 2M	2402	Ant1	-50.68	-20	Pass
NVNT	BLE 2M	2480	Ant1	-43.7	-20	Pass

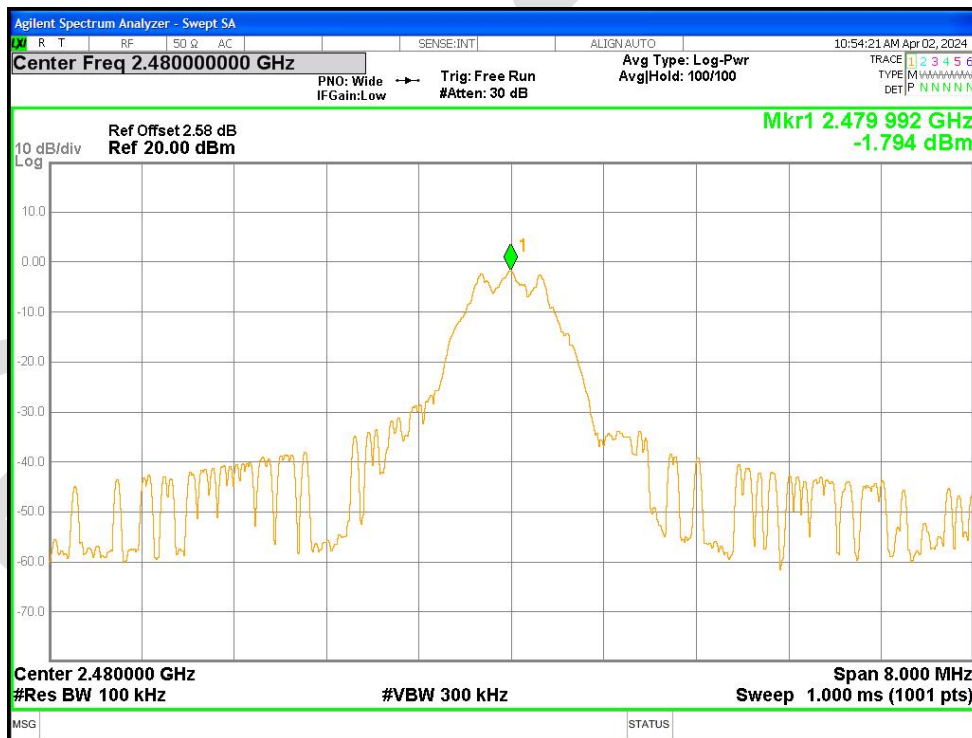
Band Edge NVNT BLE 1M 2402MHz Ant1 Ref



Band Edge NVNT BLE 1M 2402MHz Ant1 Emission



Band Edge NVNT BLE 1M 2480MHz Ant1 Ref



Band Edge NVNT BLE 1M 2480MHz Ant1 Emission